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Thermodynamic equilibrium in the expanding universe

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Abstract

We show that a relativistic gas may be at "global" equilibrium in the expanding universe for any equation of state $0 < p \leq \rho/3$, provided that the gas particles move under the influence of a self-interacting, effective one-particle force in between elastic binary collisions. In the force-free limit we recover the equilibrium conditions for ultrarelativistic matter which imply the existence of a conformal timelike Killing vector.

Keywords

Acting gas, Boltzmann equation, Conformal symmetry, Self-inter